other demographics, the uses to which telephone service can be put, and prices of complementary and competing services.

Since real prices, not nominal prices, affect the demand for telephone services, it is important to assess how inflation-adjusted prices have changed. Since divestiture, inflation has essentially offset increases in flat rate charges. Using 1984 as the base year, the SLC increased flat-rated charges from $13.35 to $16.85. Adjusted for inflation from 1984 to 1994, $16.85 translates to about $11.81 in 1984 dollars. Inflation has also offset the effect of tax and intrastate price increases, including the SLC. In 1994, the flat-rated monthly charge (including tax and intrastate increases) averaged $19.00. Adjusting for inflation, this was equivalent to $13.32 in 1984 dollars, or slightly lower than the 1984 rate.

Declines in other telephone service prices offset nominal increases in flat rates. Adjusted for inflation, from 1984 to 1994:[37]

- Interstate toll rates declined by about 47 percent;
- Intrastate toll rates fell by about 40 percent;
- Connection charges fell by 33 percent; and
- Overall telephone service rates declined by 20 percent.

Figure 1[38] shows the inflation-adjusted prices described above.[39] The figure reflects both rate rebalancing and the impact of inflation on rates for residential telephone services.

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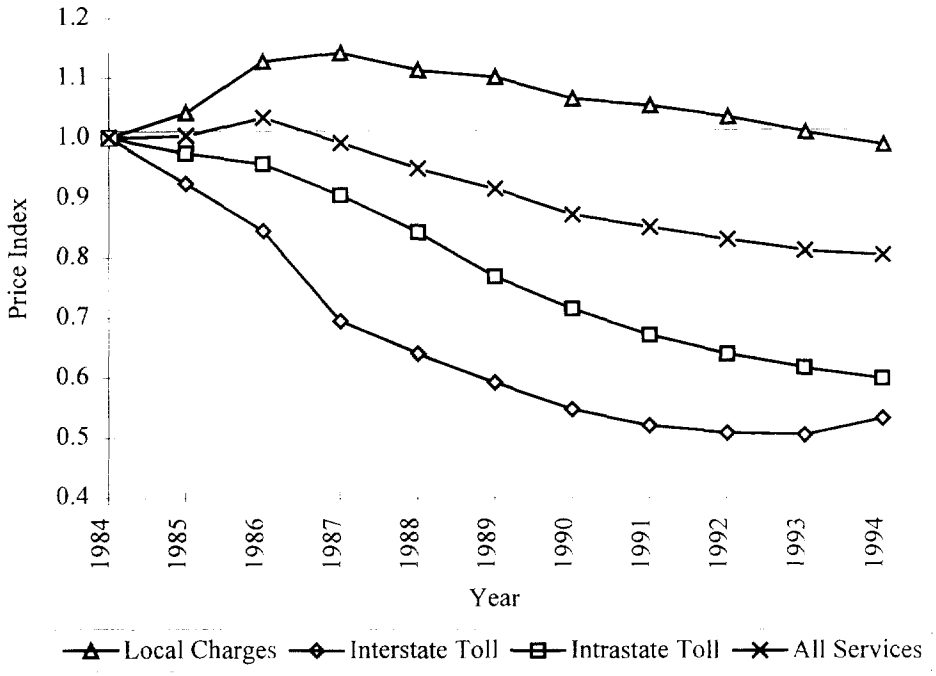
[37] Information on rates obtained is derived from *The Statistical Abstract of the United States, 1991*, Table 769, at 476, *The Statistical Abstract of the United States, 1995*, Table 762, at 493, and *The Economic Report of the President*, February 1996.

[38] *Ibid.*, Base Year = 1984.

[39] Prices were adjusted for inflation with CPI data from *The Statistical Abstract of the United States, 1995,* Table 762, at 493, *The Statistical Abstract of the United States, 1991,* Table 769, at 476, The CPI for each service was divided by the overall CPI for all goods and services. The data were then adjusted so all services had a 1984 base year.

Figure 1. Inflation-Adjusted Price Indices for Telephone Services



A study by Hausman, Tardiff, and Belinfante suggests that rate rebalancing (i.e., lowering toll rates and increasing flat-rate charges) will in fact stimulate demand for telephone access service.[40] A 1988 Southwestern Bell study comparing telephone bills from a sample of 500,000 customers with another sample of 500,000 customers in low income areas found that

> ... the reductions in toll rates since the introduction of SLCs have more than offset the amount of those charges for the average customer in both samples, resulting in a lower toll bill; the reduction of toll rates has greatly stimulated toll usage since divestiture, the growth rate of toll usage has been about twice as great for low-income subscribers as for subscribers in general, resulting in toll usage patters that are now nearly equal for both groups; and the SLC constitutes a small percentage of the average subscriber's total bill (including subscribers in low-income areas). This study provides evidence [that] the reductions in toll

[40] Jerry Hausman, Timothy Tardiff, and Alexander Belinfante, "The Effects of the Breakup of AT&T on Telephone Penetration in the United States, *American Economic Review*, 83, 1993, 178-184.

> rates have provided significant benefit to low-income households ... by making toll calls more affordable ... and ... by reducing the total bill of average and above average users of interstate toll service.[41]

According to Belinfante, disconnect studies performed by the Regional Bell Operating Companies and GTE in the Monitoring Docket during 1988

> ... [found that] virtually no households disconnected due to the SLC increase, ... most of the households disconnected for economic reasons were involuntarily disconnected due to nonpayment of their bills, and most involuntarily disconnected households were heavy users of telephone service, including toll service. These findings led me to conclude that there are far more households without phone service today because of their inability to pay for toll charges than because of their inability to pay for SLCs. This conclusion was reinforced by the observation that involuntary disconnects declined after toll rates were reduced.[42]

These studies were complemented by a survey which found that 56 percent of respondents said that they do not have telephone service because of cost, i.e., 44 percent do not have service for reasons other than cost.[43] The reasons varied widely. Some respondents wanted to avoid bothersome incoming calls, some felt no need to call anyone, some preferred to live in remote areas, etc. The basic monthly cost ranked near the bottom (only 23 percent of respondents) among reasons for finding telephone service hard to afford. Thus, only for a small subset of households that did not subscribe would any change in residential basic rates possibly have affected the affordability of telephone service. Further, of those for whom affordability was an issue, the most frequently cited impediments to subscribing were not the monthly rate but the "cost of calls outside the U.S." (49 percent) and the "cost of calls within the U.S." (40

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[41] Belinfante, in B.Cole (ed.), at 379, *op cit.*, supra, note 31.

[42] *Id.*, at 378.

[43] Field Research Corporation, *Affordability of Telephone Service: A Survey of Customers and Non-Customers*, 1993.

percent). Evidently, these respondents either could not control their own toll calls, or they could not control the toll calling behavior of other household members.[44]

Increases in the flat-rate charges have also been offset by the increased availability of lower-cost measured rate and Lifeline options. Options such as local measured service (LMS) and message rate service are typically offered at substantially lower access prices than flat rate service. For instance, in 1993, the average residential rate for flat rate local service was $18.82, while the lowest generally available rate was $11.27.[45] The availability of LMS has increased in recent years, from about 51 percent of lines in 1989 to 67 percent in 1995 for the BellSouth region.[46] Lande's study of local service finds that availability in his sample of 95 cities throughout the US has increased from 80 percent in 1987 to 89 percent in 1992.[47]

The two federal subsidy programs created to assist low-income households have also grown substantially. The Lifeline program provides subsidies to offset the SLC. Lifeline has grown since its inception in 1985 to 38 states in the United States. Federal funding for Lifeline has increased from $12 million in 1987 to $123 million in 1994, as both the size of the support grew with the SLC increases and the number of subscribers under the plan grew from about 1 million households in 1987 to 4.4 million in 1994.[48] The Link-Up program provides one-time assistance to low-income households to help pay for the initial installation fee. Link-Up

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[44] See also "Phone Plan is Attracting Immigrants in New York", by Randy Kennedy, *New York Times*, March 18, 1996, page B1. The story explains how a firm is making a niche for itself by providing resale phone service for customers in New York City who have been disconnected from NYNEX for failure to pay large toll bills among other reasons. The new company only allows customers to make long distance and overseas calls that are pre-paid, something NYNEX does not currently have the capability to do.

[45] Federal-State Joint Board, *Monitoring Report*, CC Docket No. 80-286, May 1995, Table 5.7. These figures both include the SLC.

[46] Data from BellSouth. Figures apply to residential subscribers.

[47] James L. Lande, *Reference Book: Rates, Price Indexes, and Household Expenditures for Telephone Service*, FCC Common Carrier Bureau (Industry Analysis Division), at 14. The presence of LMS is governed by two major factors: regulatory approval and the availability of stored program switches. The higher presence of stored program switches in urban areas (Lande's sample is composed of cities) explains the greater availability of LMS within the Lande sample.

[48] Federal-State Joint Board, *Monitoring Report*, CC Docket No. 80-286, May 1995, Tables 2.5 and 2.6.

currently exists in 51 states and territories (including Puerto Rico, the Virgin Islands, and the District of Columbia), and has helped over 4.4 million households to subscribe.[49]

Real income growth also stimulates demand for subscriber access. Real income has grown modestly during recent years. Median household income, adjusted for inflation, has grown from about $22,415 in 1984 to about $22,620 in 1994.[50]

Although overall rates for telephone service have decreased by 20 percent in inflation-adjusted terms, average monthly expenditures per household have increased by $3.00 per month in constant dollars in the decade following divestiture.[51] Demand for most residence telephone services is inelastic; thus, this expenditure growth suggests that the demand curve has shifted over time. This shift appears to have been caused by the availability of a growing number of telecommunications products and services, particularly beyond pure voice communication services, e.g., fax, data, voice mail, Internet, etc. It might also reflect lower prices for these services and higher prices for substitutes.

C. Continued Rate Rebalancing Will Not Harm Universal Service

A $1 increase in local rates would have a much smaller effect today than when the SLC transition began. There are three reasons for this. First, a $1.00 increase today would represent a smaller percentage increase in a person's telephone bill than it would have in 1984. For example, the first dollar of the SLC was initiated in 1985 and gradually raised to $3.50 by 1989. Were a charge of similar magnitude to be introduced today, the consequent increase in local rates would be less dramatic. This point can be seen in Table 2 where we compare rates between 1984 and 1994, the most recent year for which such data are available.

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[49] *Id.*, Table 2.7

[50] *The Statistical Abstract of the United States, 1995,* Table 724, at 469 and the *Bureau of the Census, Income, Poverty and Labor Force, Statistics Branch*, fax, figures in 1984 dollars.

[51] From FCC *Trends*, February 10, 1995 (Updated) Table 8, at13.

Table 2. Percent Increase in Nominal Local Rates Due to Increases in SLC (Current Dollars)

1984	1994
Base monthly local rate = $13.35	Base monthly local rate = $19.00
Percent increase in local rate due to $1.00 in new SLC charges = 7.6%	Percent increase in local rate due to $1.00 in new SLC charges = 5.3%
Percent increase in local rate due to $3.50 in new SLC charges = 26.2%	Percent increase in local rate due to $3.50 in new SLC charges = 18.4%
	Percent increase in local rate due to $2.50 in new SLC charges (which would raise total SLC to $6.00)* = 13.2%

* This hypothetical $6.00 SLC would match the FCC's original proposal in CC Docket No. 78-72, Phase 1

Second, the same nominal increases would mean smaller increases in real terms. The effect of inflation implies that an increase of $1.00 in local rates in 1994 would be equivalent to only a $0.70 increase in 1984. Hence, a $2.50 increase, which would have brought the total SLC up to $6.00 in 1994, would have translated into only a $1.75 increase in 1984 dollars. As Table 3 shows, when viewed in constant 1984 dollars, a total SLC of $6.00 would have resulted in a monthly local rate of $19.85 in 1984, whereas bringing the SLC up to $6.00 in 1994 (i.e., adding another $2.50 to the existing SLC of $3.50) would have brought the real local rate to only $15.07 — well below what it would have been in 1984 with a SLC of $6.00.

Table 3. Real Local Rates Due to Increases in SLC (Constant Dollars)

1984	1994 (in constant 1984 dollars)
Base monthly local rate = $13.35	Base monthly *real* local rate = $13.32 (nominal local rate = $19.00)
Local rate due to $1.00 SLC = $14.35	*Real* local rate due to an additional $1.00 SLC = $14.02
Local rate due to $6.00 SLC = $19.85	*Real* local rate due to an additional $2.50 SLC (which would raise total SLC to $6.00 in 1994) = $15.07

Assuming that the nominal flat local rate would *only* increase by the additional $2.50 in SLC charges (i.e., otherwise remain the same after 1994) and that inflation would remain steady at 3 percent annually, the real or inflation-adjusted local rate (i.e., in 1984 dollars) would be only $13.79 in 1997 (or only 44 cents higher than the 1984 rate) and this would decline to $12.62 in the year 2000. Further, if the additional $2.50 in SLC charges were to be phased in over a hypothetical four-year phase-in period, the inflation-adjusted local rate would be even smaller in each year before 2000.[52] This is shown in Table 4 below.

Table 4. Comparison of Local Rates Over Time When SLC Charges Are Increased

Year	Local Rates With SLC Raised to $6.00 in 1996		Local Rates With SLC Raised to $6.00 by 2000 (Phased-In)	
	Nominal Rate	Real Rate (1984 Dollars)	Nominal Rate	Real Rate (1984 Dollars)
1996	$19.00	$12.56	$19.00	$12.56
1997	$21.50	$13.79	$19.50	$12.51
1998	$21.50	$13.39	$20.50	$12.77
1999	$21.50	$13.00	$21.00	$12.70
2000	$21.50	$12.62	$21.50	$12.62
Note: Assumes 3.0 percent inflation annually between 1994 and 2000.				

Third, the demand elasticity for access to the public switched network is smaller today. The sensitivity of subscription levels to changes in flat-rate charges is lower today than it was when the states and the FCC rebalanced rates in the 1980s. The same factors that offset the

[52] The $2.50 increase assumed in our example would bring the SLC to $6.00 by 2000, in increments of: $0.50 in 1997, $1.00 in 1998, $0.50 in 1999, and $0.50 in 2000. This phase in is loosely based on the actual period in which the $3.50 SLC was implemented.

increases in flat-rate charges for telephone service during the last decade (e.g., wider availability of low-price access service, lower toll rates, lower connection charges, and an exogenous shift in the demand curve in response to increased quality and uses of telephone service) have also reduced the elasticity of demand with respect to flat rates. That is, as prices of complements decrease, the desirability of the service increases, and income levels rise, the sensitivity of access demand to price will also decrease. This means that faced with an equivalent percentage price increase, fewer households would discontinue service today than would have discontinued service during the 1980s. Therefore, a given increase in service charges today will likely have less of an effect on the average household today than it did during the 1980s.

It is important to note that we are not simply making the case for raising the SLC while leaving other rates unchanged. We also believe that rate rebalancing — by reducing rates — would offset the impact of a rising SLC on total telephone charges. Based on our experience in the last decade, it seems clear that rate rebalancing that leads to lower usage charges, expanded use of Lifeline programs, and increases in flat-rate charges for telephone service or in the SLC would have little, if any, adverse impact on universal service.[53]

V. ECONOMIC PRINCIPLES TO DEFINE/ANALYZE SERVICE ESSENTIALITY AND AFFORDABILITY

A. Essentiality

The FCC seeks comments on how it "should evaluate whether a service or feature is 'essential to education, public health, or public safety.'"[54] In this respect, the FCC specifically

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[53] Quantitative evidence of this is presented in Alexander Larson, Thomas Makarewicz, and Calvin Monson, "The Effect of Subscriber Line Charges on Residential Telephone Bills," *Telecommunications Policy*, 13, 1989, and T. Makarewicz, "Efficient Telecom Pricing: Who Stands to Benefit?" *Public Utilities Fortnightly*, March 15, 1996.

[54] NPRM, ¶9.

solicits comments for the following services: voice grade service, touch-tone, single party service, access to emergency services (911 and enhanced 911), and access to operator services.[55]

Historically, not all telecommunications services have been deemed sufficiently important — or "essential" — to warrant regulation to the same degree as services more closely associated with universal service, such as the services listed above. For example, even though certain vertical services offered by LECs (call waiting, call return, etc.) are not exposed to a high level of competition, those services have traditionally not been accorded the same regulatory treatment as services considered to be more essential.[56] That is, even among non-competitive services, there are some services that are deemed to be essential and the others non-essential. Therefore, whether or not a service should be considered essential does not appear to depend solely on whether it is supplied competitively or non-competitively. Accordingly, the FCC seeks guidance on what should qualify a service to be essential, and we propose the following principles in response.

We consider an end-user service[57] to be essential if it is vital for promoting and sustaining a minimal, socially acceptable standard of living. Which service qualifies for that status may be judged by asking whether (i) non-availability of the service would cause the end-user to be deprived of a means for meeting a minimum threshold of his or her social or survival needs, and (ii) availability of the service would provide a benefit to society that exceeded the direct benefit that would accrue to the end-user.

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[55] *Id.*, ¶¶16-22.

[56] It is readily evident that such services have not been either (i) subscribed to by a substantial majority of residential subscribers or (ii) universally deployed by telecommunications carriers, i.e., have not met two of the criteria established by the Act (§251(c)(1)(A)-(D)) for a service to qualify for universal service status.

[57] We refrain here from defining essentiality for services not sold to end-users, e.g., facilities, inputs, or intermediate services that would be considered essential to the further production of services but are not, in and of themselves, of any consumption value to end-users.

By the first criterion, an essential service can have no feasible substitutes, i.e., functional alternatives available at equal or comparable economic cost[58] to end-users. The dependency of end-users on a particular service deemed to be essential could be explained, at least in part, by the fact that those end-users have few options with respect to meeting their minimum social or survival needs. Therefore, subscribership to the public switched network has traditionally been the most effective means for retaining access to and communicating with communities of interest considered vital to the end-user's private and social well-being.

The second criterion — of social value exceeding private value — is frequently referred to in economics as a "positive externality" and is usually accompanied by the recommendation that the pricing of the service in question be done in a manner that recognizes the value of that externality. Consistent with this principle, we have seen a long tradition of pricing basic local residential service "low," even below its incremental cost. The economic defense of pricing that service below cost and, hence, requiring a subsidy from other services has traditionally been that the economic surplus (or social welfare) lost from pricing the service below or away from cost is compensated by the additional social welfare generated by the externality arising from the increase in network subscribership.[59] Note, however, as shown above, rate rebalancing (i.e., raising basic local rates and lowering other rates) appears to avoid the welfare losses associated with keeping basic local rates substantially below cost, without compromising subscribership. In fact, this policy combined with focused universal service support may actually stimulate demand for residential access.

We evaluate the eligibility of the services listed in the NPRM for "essential service" status by applying these two criteria to each service. The NPRM already contains some of the

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[58] That is, not just the price paid for an alternative of comparable functionality but also costs incurred in seeking out or obtaining the alternative.

[59] See, e.g., the discussion in John T. Wenders, *The Economics of Telecommunications: Theory and Policy*, Cambridge, MA: Ballinger, 1987, especially Ch. 4

reasoning that we would consider sufficient for according essential service status to the listed services.

Voice grade access to the public switched network: Voice grade access, whether by wireline or wireless means, satisfies both criteria for the same reasons that basic local residential service (of which voice grade access is a component) has traditionally been considered an essential service. There are no comparable-cost alternatives to wireline/wireless access to the network and, when a new subscriber gains such access, the value of the network as a whole (i.e., value to all existing subscribers) increases more than the value to the single subscriber. Not only would the new subscriber receive value from gaining access to educational and medical facilities, emergency services, and other communities of interest, but additional value would also be created to those very same facilities and communities from being able to access the new subscriber through the same network.

Touch-tone: As the NPRM itself states,[60] touch-tone is becoming "increasingly indispensable for subscribers" because it speeds up access to emergency services and is the predominant means for interacting with automated information systems. Although most current phone sets can easily switch between pulse and tone dialing to allow use of such services by those who do not subscribe to touch-tone service, doing so is less convenient and slower than using touch-tone service *per se*. Furthermore, the value to society of adding another subscriber to touch-tone service conceivably exceeds the private value to that subscriber because of increased awareness and utilization of touch-tone accessible services.

Single party service: This is the usage counterpart of voice-grade access. Again, the reasons cited by the FCC in the NPRM[61] and the reasons provided above for regarding voice grade access as essential qualify this service to be essential as well.

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[60] NPRM, ¶19.

[61] *Id.*, ¶20.

Access to emergency services: Traditionally, these services have been regarded as essential because of obvious public health and safety reasons. However, they appear to meet our criteria as well. While home alarm monitoring systems may represent a potential alternative to 911 and E911 services, they are also considerably more expensive (or not universally affordable) and do not, in many cases, provide the ability to communicate live with emergency and public safety officials. Hence, alarm systems may not be a feasible alternative to 911 and E911 services. In addition, access to these services may make possible increased community awareness and security, not just greater security for the subscriber. Therefore, its social value likely exceeds its private value.

Access to operator services: Traditionally, these services have been deemed essential because of public necessity and convenience reasons. However, they too appear to meet our criteria. Operator services are usually demanded whenever individuals require alternative methods of payment (credit card calls, collect calls, etc.). The method of access itself does not matter — wireline or wireless. Because such services greatly enhance the potential to use the public switched network and the communication reach of individual subscribers themselves, the social value created by such services may well exceed the private value. While other communication options to traditional sent-paid calls may exist (e.g., mail, courier service, etc.), none can match the immediacy of the communication made possible by telecommunication services, albeit operator-assisted. In that respect, no feasible alternatives may exist.

We conclude that the five services listed in the NPRM qualify to be called essential services by our two criteria.

B. Affordable Basic Local Rates

The Act requires the FCC and the states to ensure that service rates nationwide are "just, reasonable, and affordable."[62] Accordingly, the FCC seeks comment on how rate levels should

[62] The Act, sec. 101(a), §254(i).

be considered to be affordable.[63] Specifically, the NPRM asks for (i) criteria or principles for determining affordability, (ii) methods for evaluating rate levels, and (iii) procedures to recalibrate the rate levels should changes in inflation and other factors make such recalibration necessary from time to time.[64]

We start by noting that no specific guidelines for determining "affordable rates" exist today. States have used a variety of justifications to set rates for basic local residential service while allowing for different (but averaged) rate levels for different rate groups. Some states depart from the traditional flat-rated rate structure to allow measured (or usage-based) rate plans under which subscribers typically pay a combination of smaller monthly charges and usage-related charges. In addition to the state-set rates, subscribers pay an FCC-assessed SLC, currently $3.50 per residential line per month.

We propose that any affordability criterion that is adopted should pay particular attention to what subscribers or households on the margin would consider affordable. These consumers may respond to very small changes in basic local rates by changing their status, e.g., from subscriber to non-subscriber, or vice versa. For these consumers, federal and state assistance programs like Lifeline and Link-Up America are currently in place to reduce their costs of subscribing. Affordability in this sense, however, is generally not an issue for the vast majority of subscribers for whom small or even moderate increases in rates do not typically induce a change to non-subscriber status.[65]

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[63] NPRM, ¶25.

[64] *Id.*

[65] Some analysts believe that telephone services as an expenditure category are generally income-inelastic, i.e., not very responsive to changes in income. See, e.g., B.M. Mitchell and I. Vogelsang, *Telecommunications Pricing: Theory and Practice*, New York: Cambridge University Press, 1991, at 226, note 4. However, at least one study suggests that end-user responsiveness to changes in local rates does vary by income groups. See P. Cain and J.M. MacDonald, "Telephone Pricing Structures: The Effects on Universal Service," *Journal of Regulatory Economics*, 3, 1991, 293-308. This study found that households with annual income below $10,000 tend to be considerably more responsive (10-15 times) than households earning in excess of $25,000 annually. However, even for the most vulnerable, lowest-income segments, the risk of dropping telephone service was minimized by allowing households to opt for measured, rather than flat-rated, service plans.

We propose that a lower bound for affordability be constructed for low-income households on the basis of the purchasing power of those households. For this, we first focus on households that qualify for various forms of public assistance, e.g., Social Security Insurance (SSI), Aid to Families with Dependent Children (AFDC), and Food Stamps. Recipients of these forms of public assistance also qualify for Lifeline assistance in most participating states.[66] In other states (e.g., Arizona, California, Michigan, etc.), eligibility for Lifeline is based on household income being up to 130-150 percent of the poverty level. Accordingly, we propose that, for present purposes, affordability be based on household income of 125 percent of the poverty level.

Earlier, we showed that the average size of a household living at or below the poverty level in 1993 was 2.97.[67] By linearly interpolating between poverty threshold incomes of impoverished households of sizes two and three ($9,646 and $11,807 respectively),[68] we calculate that the annual poverty threshold level of income in 1994 for a household of size 2.97 was $11,745. Furthermore, at 125 percent of the poverty threshold, that household had an annual income of $14,681. We also note that the average annual income in 1993 of households at the top of the lowest quintile (20 percent) of the income distribution was $16,952,[69] i.e., *above* the 125 percent of poverty level.

Recent data show that while average annual expenditures of households on all forms of telephone service are about 2.0 percent of expenditures on all items, there is some variation in that percentage between low and high income households. For example, while only 1.4 percent of annual expenditures was directed at telephone service by the *highest* income quintile in 1991, up to 3.1 percent of annual expenditures was so directed by the *lowest* income quintile in

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[66] Federal-State Joint Board, *Monitoring Report*, CC Docket No. 80-286, May 1995, Table 2.4.

[67] See supra, note 35

[68] Constructed from *Statistical Abstract of the United States, 1995*, Tables 746 and 761.

[69] *Statistical Abstract of the United States, 1995*, Table 733

that year.[70] Applying the latter percentage to the average household income at 125 percent of the poverty level (i.e., $14,681), we estimate that household's average expenditure on all telephone services to be $455 per year or $37.90 per month.

Other data indicate that, for the lowest income quintile, a household's expenditures on basic local service has remained between 43 and 48 percent of its expenditures on all forms of telephone service.[71] Accordingly, assuming that 45 percent of such expenditures were on basic local service in 1994, we estimate that the average household at 125 percent of the poverty level would have spent $17.06 per month on basic local service. This estimate can serve as a lower bound on the affordability threshold for basic local rates for low-income households.

It is noteworthy that the affordability benchmark of $17.06 per month is based on *actual* out-of-pocket household expenditures on basic local service. That is, a household that receives Lifeline assistance or other basic rate subsidies could, in principle, afford a *gross* basic local service bill of at least $7 more (at current SLC levels) or nearly $24. Also, many, if not most, of these households could reduce their out-of-pocket costs of basic local service by opting for measured rate local service plans which often cost far less. For example, in 1992, while the national average monthly flat-rated local service cost households $18.66 per month (including SLC but not Touch-tone), the national average measured rate was only $11.12 per month (including SLC).[72]

It is instructive to evaluate our proposed lower bound for the affordability threshold in light of national average flat-rated local rates. According to a recent survey of 95 cities typically sampled by the Bureau of Labor Statistics for constructing its CPI values, flat-rated basic local service was priced on average at $19.74 (with touch-tone service) per month in

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[70] These percentages are remarkably stable over time and, hence, can be assumed to be true in the latter half of the 1990s as well. See James L. Lande, *Reference Book: Rates, Price Indexes, and Household Expenditures for Telephone Service*, FCC Common Carrier Bureau (Industry Analysis Division), May 1993, Table 7.

[71] *Id.*, Table 8. Lande provides annual data from 1984 to 1991.

[72] *Id.*, Table 4.

1992. This was down slightly from $19.83 in 1991.[73] As stated above, measured rate plans were priced on average (not including usage) at $11.12 per month in 1992. Both sets of average rates included a federal SLC of $3.50 per month. In light of these figures and the very small increase in local residential rates in recent years, we surmise that there is room for those rates to rise further. For example, if the federal SLC were to rise another $2.50 per month (to $6 per month), the average flat-rated service — starting with the 1992 base — would be priced near or just above $22.33. This would be affordable because assistance-eligible households that can afford at least $17.06 per month could receive an additional $7 to $12 in total Lifeline assistance (assuming current plans remain in effect).[74] If the SLC were to rise from its present level of $3.50 to $6 per month, the total Lifeline support could rise from $7 to $12 per month. Households not eligible for Lifeline assistance would also not be disadvantaged by a flat-rate near $22.33 because of their greater purchasing power.[75] Since the affordability threshold here is calibrated to the purchasing power of households that qualify for Lifeline and other assistance, it follows that such a threshold would keep rates affordable for non-assistance-eligible, i.e., higher-income, households as well. We conclude that raising the monthly residential subscriber line charge to $6 per line would still keep basic residential local rates affordable for all households.

We also conclude that our affordability threshold of nearly $17.00 per month would receive substantial support from any move to make overall telephone service affordable, especially for the most economically vulnerable households. For example, institution of toll

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[73] *Id.*, Table 2. Even though prices of other components of local residential service have trended up slightly since 1990, reductions in touch-tone rates have offset or more than offset those increases.

[74] Except for California, eligible households in every other Lifeline-participating state receive at least twice the level of the interstate SLC in support, of which half is federal support and the other half is matching state support.

[75] These households typically have a lower percentage of their expenditures on telephone services directed at basic local service — 38.5, 36.4, 33.3, and 26.8 percent for the second, third, fourth, and highest income quintiles in 1991, respectively. Lande, supra, note 70, Table 8.

limitation services[76] and/or reductions in rates for toll or discretionary services would amount to rate rebalancing that consumers on the margin of subscribership would find to their advantage. This form of rate rebalancing would offset the higher SLCs with lower charges for other services, with little or even favorable impacts on overall bills.

VI. OTHER ISSUES

A. Competitive Bidding for Universal Service Support

The NPRM seeks comment on whether competitive bidding (using a form of Dutch auction) should be used to determine which carriers should provide universal service and receive universal service support.[77] Specifically, it wishes to know whether competing carriers should be allowed to bid to set the level of universal service support, with the lowest bidder in a given serving area winning the right to serve that area.

The overarching objective of ensuring that the least-cost provider serves a particular area is indisputably in the public interest. The question, however, is whether a competitive bidding process is the best way to achieve that objective. In our opinion, the answer is "no." We believe instead that the methodology that we have proposed for determining the initial level of support is more effective and economical and administratively simpler than the competitive bidding process.

The competitive bidding process is unnecessary for the stated purpose. Our proposed methodology for setting the level of support, besides being administratively simpler, would also let the "invisible hand" of market competition determine the least-cost providers. As we explained before, the per-line support would be set initially as the difference between the incumbent's per-line embedded cost of basic service and the basic rate. With that support

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[76] NPRM, ¶¶54-55.

[77] NPRM, ¶¶35-37.

available to any competitor that actually serves final consumers, the market would send universal service support to carriers that needed less per-line support (because of their inherent relative efficiency) and could lower the basic rate to consumers. This process would continually match the competitor's incremental cost against the incumbent's embedded cost (and, eventually, the incremental costs of all competitors) and ensure that only the least-cost provider served the market and received universal service support to the extent needed.

In addition, we believe that competitive bidding could be a complicated, costly, and potentially contentious process that either federal or state regulators or some other neutral entity would have to administer and oversee. Moreover, as technology changes and different service providers enter or exit the market over time, competitive bidding would have to be conducted repeatedly in order to ensure that only the least-cost providers qualified for support at all times. A similar process may be needed as high cost areas are periodically refined with respect to their geographic and/or demographic characteristics.

In sum, under our proposed method, the competitive market would ensure that prices ultimately move towards cost without requiring an externally-administered bidding process to generate competition.

B. Proxy Cost Models

The NPRM seeks comment on the usefulness of proxy cost models (such as the Benchmark Costing Model[78] or BCM) for determining the level of universal service support in different serving areas.[79] As the NPRM states:[80]

> The [BCM] produces a benchmark cost range for a defined set of residential telecommunications services assuming efficient wireline engineering and design,

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[78] Jointly sponsored by MCI, Sprint, NYNEX, and US West in CC Docket No. 80-286 (December 1, 1995).

[79] NPRM, ¶¶31-32.

[80] *Id.*

> and using current technology. It is not based upon the costs reported by any company, nor the embedded cost to a company of providing service today.

This description also helps explain why the BCM, in its present form, is not sufficient for determining the appropriate level of universal service support. The BCM's purpose is to identify geographic areas which are relatively high or low cost to serve, i.e., to provide benchmarks of how much more or less expensive one area is relative to another. Its purpose, however, is not to determine the absolute level of cost for any area.

By construction, this model would not produce the forward-looking costs of any particular carrier that would likely compete in the local exchange market in a particular state. The BCM uses nationwide values for critical cost inputs such as network equipment costs and installation costs, and assumes engineering practices that cannot be attributed to a particular carrier and might not be feasible or optimal in particular circumstances. Also, since it only produces relative costs, the BCM cannot help to determine the absolute size of the proposed universal service fund. Instead, the model only indicates which serving areas (census block groups or CBGs) are more costly to serve than others.

There are other specific problems with the BCM in its current state. First, the BCM focuses specifically on the investment portion of local telephone service. It accounts for the operating expense portion of costs through assumed annual cost factors on which even the sponsors are not in complete agreement. Second, the BCM does not always accurately represent the locations of existing or planned facilities or assign the CBGs to the correct wire centers. For example, in a recent regulatory proceeding in Kentucky, it was argued that 16 percent of the CBGs in that state were incorrectly assigned by the BCM.[81] In our opinion, this is a compelling reason for caution in using CBGs as the geographic units in cost models.[82]

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[81] Kentucky Public Service Commission, In re: *An Inquiry into Local Competition, Universal Service, and the Non-Traffic Sensitive Access Rate*, Administrative Case 355. Rebuttal Testimony of Peter F. Martin for BellSouth Telecommunications, March 11, 1996.

[82] The NPRM, ¶34, asks whether CBGs are the "best geographic units for developing a proxy model."

Third, certain cost assignments may depart from the best engineering practices followed in a state. Assumptions made about loop lengths, switch types for rural and urban areas, feeder lengths at which fiber is placed, etc. may not be representative of that state and, hence, produce incorrect estimates of cost.[83]

We believe that the BCM is not yet sufficiently reliable for determining proxy costs for specific serving areas in a state. Even its sponsors are unable to agree on specific assumptions and parameter values under which it should be run. Its predictions would be all the more unreliable as the cost of capital and depreciation rates both rose with the advent of local competition. The BCM is most troubling because it does not depict the actual costs of an actual local exchange carrier. Moreover, the "scorched node" assumption[84] that underlies its optimized network model pays little attention to the characteristics of a real-world carrier. With a technology and a network already in place, an existing carrier's options for future technology choice and network optimization would be quite different from — and more constrained than — those faced by a new entrant into the local market. Hence, the BCM's claimed strength — that it does not represent costs of a particular carrier but rather that of a representative optimized carrier — is also its biggest drawback.

In general, there are two problems with using optimization models for estimating incremental costs: (i) the optimization process usually succeeds only at providing the lower bound on incremental costs, and (ii) the models ignore real-world details which cause actual incremental costs to exceed the models' estimates.

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[83] Timothy J. Tardiff reports that in California, when California-specific assumptions and corrections to the BCM were made, costs rose by about 20 percent: see T. J. Tardiff, *Universal Service Funding and Cost Modeling*, prepared for Pacific Bell, January 19, 1996 and *Evaluation of the Benchmark Cost Model*, prepared for Pacific Bell, December 1, 1995.

[84] "Scorched node" describes an idealized model in which the most efficient engineering practices are adopted and state-of-the-art loop and switching technology are deployed but the currently existing local exchange network topology (locations of switches, etc.) is accepted. An even more idealized model, often called "scorched earth," would replace the existing network topology with an "optimal" topology, i.e., one in which locations of network components could be optimally and costlessly reconfigured without regard to the actual prior history of the network.

First, as we have argued for the BCM, an optimization model that calculates forward-looking incremental costs for a network that deploys optimal technology at all times cannot depict the actual incremental costs of a real-world network. While such a model may well serve as a predictor of costs for a new network, it cannot possibly depict costs of an existing network with its inherent rigidities. An example will show the type of problem created by the assumption of constant optimization:

Suppose there are 10,000 households uniformly distributed in a square around a wire center, so that each household is served by one of 4 feeder routes. Ignore the need for spare capacity and growth and assume that an efficient network would supply only one loop to each household. Suppose also that cable sheathes come in units of 100, 500, 1000, 2000 and 2500 pairs and that unit costs are much smaller with larger sheath sizes. An optimization model would first calculate the total cost of the network at 80 percent of its current demand, and the feeder network for this calculation would contain four 2,000-pair cables. Next, the model would recalculate the optimal network to serve 10,000 households; the feeder part of this network would then contain four 2500-pair cables. The difference in total costs of these optimized networks — divided by 2,000 loops — would constitute the incremental cost of serving each household.

In the real world, however, suppose we begin with an idealized network serving 8,000 households today. If that network experienced growth of 2,000 households, it could not simply scrap its 2,000-pair cable and serve its customers with the 2,500-pair cable that an optimization model would assume. Instead, the network would most likely augment its 2,000-pair cable with an additional 500-pair cable in each direction. The net result would be a higher incremental feeder cost per circuit than that calculated by a model based on the assumption of constant optimization.

Optimization models also typically use simplifying assumptions to keep the computations and simulations tractable. In particular, such models (i) assume a uniform geographic distribution of customers within a wire center, (ii) ignore the real-world complications of mountains, rivers, unusual or difficult terrain or climatological events, and

(iii) fail to account for demographic and population shifts within a network's serving jurisdiction which may necessitate adjustments that an idealized network could disregard.[85] Because optimization models cannot typically account for these elements, the estimates of total and incremental costs that they produce are not relevant measures of those costs incurred by an actual efficient carrier.

We conclude that idealized, optimization-based network cost models tend, at best, to produce idealized minimum cost estimates that provide only a starting point to calculate the actual costs of an actual network. Incremental costs in a network that is optimized at every point in time must underestimate the true incremental costs of network operation because real-world networks have fewer options than continually-optimized networks. Apart from the lumpiness of its network capacity (because it lacks the ability to make fine, marginal adjustments), a real-world network cannot simply resize its facilities to serve more or fewer customers or to take advantage of the latest trend in technology. Unlike optimized networks, therefore, real-world networks can only "optimize" on a going forward basis, conditional on the networks as they currently exist, their past histories and peculiarities notwithstanding.

VII. CONCLUSION

The Commission and the Joint Board face a challenging responsibility — balancing the multiple (sometimes disparate) goals and requirements of the Act — to promote both universal service and more efficient competition. We believe that, in this pursuit, the past is prelude: the FCC and the states have shown that it is possible to rebalance rates to promote both economic efficiency and universal service. Following the principles we articulate above would help the Commission and the Joint Board reach the appropriate balance. As we demonstrate, this can be done by (i) phasing in modest increases in the SLC (to reduce the current implicit internal

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[85] This responds to the NPRM's request at (¶34) for comment on "whether the assumption of uniform population distribution adequately reflects the possibility that in some rural areas, despite the theoretical sparsity, all lines are clustered near a single location" and "whether the [BCM] could be improved by the addition of other variables, such as climate or slope."

subsidies developed under past regulatory policies), and (ii) replacing the remaining implicit subsidies with explicit, targeted, and competitively neutral support mechanisms. This approach would promote the universal service goals of the Act, with minimal harm to another "fundamental underlying principle of the Act ... to provide ... a pro-competitive and de-regulatory national policy framework."[86] Resuming the rate rebalancing effort initiated, but not completed, in the mid -1980s would capitalize upon the fresh opportunity for substantive and pro-competitive reform offered by the 1996 Telecommunications Act.

[86] NPRM, ¶8.